



**Fw: NW Natural, Upper Alluvium WBZ Extraction Wells Step -Drawdown Testing Comments**

**Sean Sheldrake** to: bayuk.dana  
Cc: "Peterson, Lance"

04/23/2012 04:10 PM

Dana,

EPA was not aware of the datalogger/sensor limitations, nor the monitoring methodology that NW Natural planned to implement given the limited description provided for the upper alluvium well step testing in their "*Upper Alluvium Extraction Well Design Work Plan, NW Natural Gasco Site, Portland, Oregon* " document dated January 31, 2012. Based on the additional information provided by NW Natural, the constant rate monitoring following step-testing as presented in an April 23, 2012 email by John Edwards (Anchor QEA) is acceptable.

Let us know if you have any questions.

Thank you.

S

Sean Sheldrake, RPM, Unit Diving Officer  
USEPA, Region 10  
Environmental Cleanup Office  
1200 Sixth Avenue, Suite 900, ECL-110  
Seattle WA 98101-3140  
sheldrake.sean@epa.gov  
Phone: 206/553-1220

Region 10 Dive Team: <http://www.epa.gov/region10/dive>

EPA Divers only: <http://204.47.216.153:9876/r10/infopage/cleanup.nsf/webpage/DSBtechdirector>

Portland Harbor Cleanup: <http://www.epa.gov/region10/portlandharbor>

Green Cleanups: <http://yosemite.epa.gov/R10/extaff.nsf/programs/greencleanups>

Green Cleanups (EPA only):

<http://204.47.216.153:9876/r10/infopage/cleanup.nsf/webpage/greener+cleanups>

Health and Safety (EPA only): <http://204.47.216.153:9876/r10/infopage/cleanup.nsf/webpage/H&SecI>

Deliveries: Parking Garage mailroom (1st floor)

Visitors: Check-in @ PERC / Service Center on 12th floor:

<http://yosemite.epa.gov/r10/extaff.nsf/Homepage/Visiting+Seattle>

----- Forwarded by Sean Sheldrake/R10/USEPA/US on 04/23/2012 04:10 PM -----

From: John Edwards <jedwards@anchorqea.com>  
To: Dana Bayuk <BAYUK.Dana@deq.state.or.us>  
Cc: Henning Larsen <LARSEN.Henning@deq.state.or.us>, Sean Sheldrake/R10/USEPA/US@EPA, "Coffey, Scott" <CoffeySE@cdmsmith.com>, "Lance Peterson (PetersonLE@cdm.com)" <PetersonLE@cdm.com>, Bob Wyatt <rjw@nwnatural.com>, Patty Dost <pdost@pearllegalgroup.com>, Ben Hung <bhung@anchorqea.com>, John Renda <jrenda@anchorqea.com>, "Gainer, Tom" <Gainer.Tom@DEQ.state.or.us>, Tim Stone <tstone@anchorqea.com>, Matt Wilson <mwilson@anchorqea.com>, Chris Neville <cneville@sspa.com>

Date: 04/23/2012 10:07 AM

Subject: NW Natural, Upper Alluvium WBZ Extraction Wells Step-Drawdown Testing Comments

Hello Dana.

Regarding DEQ and EPA comments on the Gasco step test procedures please take a look at the email below from Chris Neville. Neville has been a consultant to the Gasco source control project for several years and is a nationally recognized expert and lecturer on aquifer analysis methods.

Neville's comments are consistent with our email response sent to DEQ on April 19 at 5:22 PM. Chris was not able to respond before we sent out our April 19 email to DEQ/EPA because he was teaching a "Critical Thinking in the Interpretation of Pumping Tests" workshop. To accommodate DEQ comments our plan is to begin the PW-6U step test tomorrow morning with the transducers programmed to make readings at constant 15 second intervals throughout the entire test. We also plan to continue each step for a minimum of the DEQ-requested 100 minute time period. You will notice in the attached PDF entitled **Drawdown**, that Neville uses the data plots from the previous step test of PW4-85 (now named PW3-85) to illustrate the appropriate analysis method.

As mentioned in our April 19 email we request DEQ approval of the step test plan today, thereby enabling our team to resume step testing tomorrow morning.

John

**John E. Edwards, RG, CEG**

**ANCHOR QEA, LLC**

\*Please note new extension and direct line number

6650 SW Redwood Lane  
Suite 333  
Portland, Oregon 97224  
Main 503-670-1108, Ext 170  
Direct 503-924-6170  
Fax 503-670-1128  
Cell 503-816-6595

**ANCHOR QEA, LLC**

[www.anchorqea.com](http://www.anchorqea.com)

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**From:** Chris Neville [<mailto:cneville@sspa.com>]

**Sent:** Friday, April 20, 2012 5:37 AM

**To:** John Edwards

**Cc:** John Renda; Michael Riley

**Subject:** Re: Gasco Step Test

John:

I apologize for the delay in responding. I was out all day yesterday.

I do not think that setting the transducers to logarithmic time stepping during the recovery period is a good idea. There are two compelling reasons why retaining the small constant steps used during the pumping portion is preferable (and 1 minute stepping is definitely sufficient):

1. If a constant time step is retained across the steps and into recovery, then it is straightforward to use the recovery data to extend the effective duration of pumping, following the method of van der Kamp (1989). I am attaching a brief paper on the subject; and

2. Using a constant time step affords better resolution of the natural variations in water levels that will occur during the recovery period. This is important in allowing us to 're-construct' the entire water level history in the pumping well and any observation wells that are affected by pumping. We need to do that because the drawdown at any time is defined not as the water level at the start of the step test minus the water level at any subsequent time, but rather as the water level that would have been observed if there had not been any pumping minus the water level at any subsequent time. I have attached two slides to drive this last point home.

The use of logarithmic time stepping is convenient for limiting the number of measurements that are made. As pumping, or in this case recovery, progresses, the changes in water levels slow down, and the timing between measurements can be increased. In the "old" days, adopting logarithmic time stepping would serve to either limit the number of manual measurements, or to save memory on the transducers/dataloggers. Memory is cheap now, so the extra measurements that are recorded by using a constant step of 1 minute far outweigh the disadvantages of collecting "too many" measurements.

Regarding the request regarding water level change, I might be able to understand the EPA recommendation if it was cast in terms of "the water level change caused by pumping is less than .02 ft/10 minute interval", although 0.02 ft is a entirely arbitrary value. But even then, I think it is preferable to follow standard practice and adopt a constant duration for each step of the test. The adoption of constant time steps simplifies the interpretation, and certainly simplifies the execution of the test in the field.

As a compromise, I would be willing to suggest that the EPA let you go ahead with the first test, using 1 minute constant time steps, and pumping steps of a fixed duration of say 1 hour. Everyone can then look at the data and see whether this approach will meet the testing objectives.

I hope this helps,  
Chris

On Wed, Apr 18, 2012 at 7:26 PM, John Edwards <[jedwards@anchoragea.com](mailto:jedwards@anchoragea.com)> wrote:  
Hi Chris

We have gotten some feedback from EPA on our step test plans. They want us to set the transducers to make measurements on logarithmic intervals for the recovery portion of the tests, but we are using mini troll 500 transducers that do not have the logarithmic option. We are running the tests at 1 minute intervals throughout the entire test including the pre and post test ambient measurements. Do you think the logarithmic request is justified? Also EPA wants us to

continue each step until the water level change is less than .02 ft/10 minute interval. But that won't work in this riv

Sent from my iPhone

On Apr 17, 2012, at 10:44 AM, "Chris Neville" <[cneville@sspa.com](mailto:cneville@sspa.com)<mailto:[cneville@sspa.com](mailto:cneville@sspa.com)>> wrote:

John:

Based again on what I have observed previously at the site, I don't see much value in extending the steps beyond 1 hour duration. That should be plenty of time to observe stabilization, and seems to be standard practice for step tests. I am attaching a companion plot to the figure that I sent in my last reply. You can see that once the drawdown is established it increases gradually, but I attribute most if not all of the underlying decline in water levels to the decline in the level of the river.



Chris Neville-van-der-Kamp\_2012.pdf Drawdown.pdf